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A REVISION OF THE GENUS *SUASTUS* MOORE (LEPIDOPTERA: HESPERIIDAE)

By W. H. Evans.

(*British Museum (Natural History).*)

The abbreviations are the same as those used in Evans, 1932, *Identification of Indian Butterflies*, 2nd edition.

SUASTUS Moore, 1881 : Type *gremius* Fabricius : type fixed by author.

1 (2*a*). UnH with a conspicuous black cell-spot, at least as large as any discal spot.

gremius. 3 subspecies.

(*a*). UpF with white spots. Above and, more particularly, below, darker than continental specimens. F 18 mm.

Subsp. *subgrisea* Moore, 1878 : ♂ Ceylon : type B.M.
B.M. 16 ♂♂, 23 ♀♀ Ceylon.

(*b*). Similar but paler. F 18 mm.

Subsp. *gremius* Fabricius, 1798 : " India Orientali " (South India assumed).
Syn. *disu* Kollar, 1844 : Himalayas.
robsonii De Nicéville, 1895 : ♂ Mussoorie. Aberration.
centripuncta Seitz, 1927 : no locality. Aberration.
B.M. 14 ♂♂, 14 ♀♀ South India. 4 ♂♂, 4 ♀♀ Central India. 2 ♂♂, 2 ♀♀ N.W. Himalayas (to Murree). 3 ♂♂, 5 ♀♀ Bengal. 11 ♂♂, 2 ♀♀ Sikkim. 10 ♂♂, 6 ♀♀ Assam. 7 ♂♂, 8 ♀♀ Burma. ♂, ♀ Siam. 3 ♂♂, 3 ♀♀ Hong Kong. ♂ Hainan. 8 ♂♂, 5 ♀♀ Formosa.

(*c*). ♂ above unmarked : ♀ upF spots in spaces 2 and cell. UnH whitened as in *minuta*. F 17 mm.

Subsp. *chilon* Doherty, 1891 : ♂ Sumba.
B.M. 2 ♂♂ Sumba. ♂, ♀ Flores.

2*a* (1). UnH black cell-spot inconspicuous or absent.
2 (3*a*). UnF broadly white from middle to termen. F 18 mm. UpF spotted.

migreus Semper, 1892 : ♂ Luzon.

B.M. ♂ Luzon. 2 ♂♂ Mindanao. ♀ Philippines.

3*a* (2). UnF dorsum never white to termen. Smaller, F 14 mm.
3 (4). UnF dorsum centrally white marked. UpH no tornal white area.

minuta. 5 subspecies (*sala* auctt. *nec* Hewitson, and *rama* auctt. *nec* Mabille).

(*a*). UpH unmarked. UnH tornal two-thirds white.

Subsp. *minuta* Moore, 1877 : ♂ Ceylon : type B.M.
syn. *sinhalus* Plötz, 1885 : ♂ Ceylon.
B.M. 24 ♂♂, 11 ♀♀ Ceylon.

(*b*). UpF typically with only two spots (in spaces 2 and 3). UnH dark brown, markings very faint. H cilia dark brown.

Subsp. *bipunctus* Swinhoe, 1894 : ♂ Nilgiris.
B.M. 11 ♂♂, ♀ South India (Coorg. Nilgiris).

(*c*). UpF typically with spots fully developed; two small separated cell-spots, discal spots in spaces 1*b*, 2 and 3 and an apical dot in space 6. H cilia narrowly white.

Subsp. **aditia** nov. : ♂ Sikkim : type B.M.
B.M. 3 ♂♂, ♀ Sikkim. 5 ♂♂, 2 ♀♀ Assam. 23 ♂♂, 11 ♀♀ Burma (to Mergui). 10 ♂♂, 6 ♀♀ Siam. ♂ Java (?).

(*d*). Larger (F 15 mm.) and darker. UpF spots larger, but no apical spots in space 6.

Subsp. *aditus* Moore, 1884 : ♂ Andamans.
B.M. 11 ♂♂, 13 ♀♀ Andamans. ♂ Coco Is.

(*e*). UpF with spots in spaces 2 and 3 and a lower cell-spot. UpH cilia white. UnH with the tornal two-thirds white as in *minuta*.

Subsp. *scopas* Staudinger, 1889 : ♂ Palawan.
B.M. ♂ Palawan.

4 (3). UnF dorsum entirely dark brown. UpF unmarked. UpH with a subtornal white area and cilia white. UnH white except for narrowly dark costa.

everyx. 2 subspecies. Genitalia as *minuta* : fly together in Tavoy.

(*a*). UpH tornal white area narrow, 2 mm., and divided along vein 1*b*.

Subsp. *everyx* Mabille, 1883 : Malacca.
syn. *tripura* De Nicéville, 1891 : ♀ Perak : type B.M.
B.M. 2 ♂♂ Burma (Tavoy). ♀ Siam (Renong). 4 ♂♂, ♀ Malaya. 4 ♂♂ Sumatra. 6 ♂♂, 2 ♀♀ Borneo.

(*b*). UpH tornal white area 3 mm., entire.

Subsp. *albescens* Mabille, 1891 : ♂ Java : type B.M.
B.M. 9 ♂♂, 4 ♀♀ Java.

A REVISION OF THE GENUS *AEROMACHUS* DE N. (LEPIDOPTERA: HESPERIIDAE)

By W. H. Evans.

(*British Museum (Natural History)*.)

The genus *Aeromachus* merits careful study in respect of the value of structural characters. The following key is based on the antennal club, the variation of which is remarkable and the differences that, in some Hesperiids, would be regarded as of generic value. The genitalia indicate a close relationship between *inachus* and *propinquus* and it is remarkable that the two species appear not to fly anywhere together, while the variation in *stigmata* seems to show that the two very different types of secondary sexual characters are actually closely connected: in fact, *stigmata*, which has genitalia very similar to *inachus*, seems to combine in its various forms the characters of *inachus* and *propinquus*. Then, again, the alliance between *jhora* and *dubius* would appear to be much closer than is indicated in the key and, here also, they do not seem to occur anywhere together.

The abbreviations are the same as those used in Evans, 1932, *Identification of Indian Butterflies*, 2nd edition.

AEROMACHUS De Nicéville, 1890: Type *stigmata* Moore, fixed by De Nicéville.

Syn. *Machaeus* Swinhoe, 1912: type *jhora* De N., fixed by Swinhoe.

1*a*(9*a*). Antennae tip pointed.

1*b*(7*a*). Antennae with well-defined apiculus from beyond thickest part of club, at right angles to club: nudum 5/5.[1] Wings produced, costa notably longer than dorsum in ♂.

1*c*(3*a*). UnH with purple markings. UpF unmarked.

1 (2). ♂ upF with a white stigma from mid vein 1 to base vein 3, set in a black area and almost entirely covered with black hairs: vein 2 displaced to near vein 3, which is mid veins 2 and 4: H veins 6 and 7 hairpinned. Uncus broad with the end rounded. UnH central purple band comparatively broad and continuous. F 13 mm. Antennae chequered, and white under club.

catocyanea Mabille, 1876: Thibet: Paris Mus. No figure.

B.M. 10 ♂♂ W. China (Tatsienlou. Siaolou. Tsekou. Likiang-Yunnan).

2 (1). ♂ upF with an obscure short whitish dash over mid vein 1: veins normal F and H. Uncus similar. UnH central markings narrow and broken. F 13 mm. Antennae similar.

kali De Nicéville, 1895: ♂ Sikkim: type Calcutta Mus.: figured. Fig. *Lep. Ind.*; Seitz (very bad).

[1] Of the portion of the antennae denuded of scales (nudum) there are 5 segments on the club before the reflexed apiculus, and 5 on the apiculus.

B.M. 4 ♂♂ Sikkim. 34 ♂♂, 2 ♀♀ Assam. 31 ♂♂ North Burma (to Shan States).

3*a*(1*c*). UnH with white or grey markings.
3*b*(5*a*). UnH with the veins outwardly more or less white. Uncus tapering to a rounded end, narrow.
3 (4). UnH with a conspicuous white spot towards base of space 7. Antennae club conspicuously white behind club (unique in genus). UpF with well-marked white spots. UnH with black cell-spots.

inachus. 3 subspecies.

(*a*). UnH veins ochreous, contrasting with the white spots. Larger: ♂ F 13 mm. (Japan: Amur specimens are smaller).

Subsp. *inachus* Ménétriés, 1859: Amur. Figured by author in Schrenk's *Reisen*, 1859: Pryer, 1889: El. & Edw. and genitalia. Leech's figure is of *propinquus*.
B.M. 12 ♂♂, 12 ♀♀ Japan. 3 ♂♂, ♀ Amur. ♂, ♀ "West China" (probably Japan).

(*b*). UnH veins nearly as white as the spots. Smaller. ♂ F 11½ mm.

Subsp. **nanka** nov.: ♂ Lungtau, Nanking, Prov. Kiang Su, China. 9.vi.1933 (*H. Höne*) in B.M.
B.M. 10 ♂♂, ♀ type locality. ♂, ♀ Taishan, Shantung. 2 ♂♂ Hoang-Shan, Hunan. ♂, ♀ Leon Fang. 2 ♂♂ Hou Pe.

(*c*). UpF white spots smaller: unH much darker, whitish bands more conspicuous.

Subsp. *formosanus* Matsumura 1931: ♂ Formosa.
B.M. Nil. Not seen and identification doubtful.

4 (3). UnH without a conspicuous spot towards base of space 7. Antennal club only white below. A confusing species as to determination of forms and subspecies.

stigmata. 5 forms.

(*a*). ♂ upF with a conspicuous black stigma accompanied by the vein distortions as in *catocyanea*. UpF with conspicuous white spots. UnH no black spot in cell. Apparently the dry-season form in the West Himalayas. F 12 mm.

Form *stigmata* Moore, 1878: ♂ Mussoorie: type B.M. Figured in *Lep. Ind.* El. & Edw. fig. is of the wet-season form.
B.M. 6 ♂♂, 6 ♀♀ N.W. Himalayas (Murree to Kumaon). 16 ♂♂, 3 ♀♀ Sikkim.

(*b*). Similar but stigma set in a large black area. UpF spots obscure or more usually absent; unF cell-spot absent. UnH black cell-spot usually present in Eastern part of its range and absent in the West. F 12 mm.

Form **soda** nov.: ♂ Sikkim, 24.ix.1889 (*Otto Müller*), in B.M. Figured by El. & Edw. as *stigmata*.

B.M. 4 ♂♂, ♀ N.W. Himalayas (Murree to Kumaon). 20 ♂♂, 2 ♀♀ Sikkim. 28 ♂♂, 5 ♀♀ Assam. 15 ♂♂, 3 ♀♀ Burma (to Karens). ♂ Yunan (Manao).

(*c*). Exactly like *stigmata* except that the stigma is narrow and inconspicuous, but the spots upF are very close and sharply defined. F 12 mm.

Form *obsoleta* Moore, 1878 : Cherrapunji : type " Coll. Staudinger " (not seen).

Syn. *discreta* Plötz, 1885 : India (Plötz drawing No. 1477) in B.M.(N.H.), reproduced by Swinhoe, 1908; seems to correspond more with *obsoleta* than anything else. El. & Edw. figure represents a ♂ and Seitz' figure is a reduced copy of it.

B.M. 6 ♂♂, 2 ♀♀ Manipur (Kabruk, Sebong). Naga Hills (Kohima and Kirbari). ♂ Bhamo.

(*d*). UpF as *stigmata*, but the stigma is reduced to a black dot under the origin of vein 3 and an obscure whitish dash over the middle of vein 1 : the veins are normal. UnH with a large and very conspicuous black spot in the cell. F 12 mm.

Form **spuria** nov. : ♂ Kanglatombi, Manipur, 3000 ft., vi.1911 (*H. C. Tytler*) : in B.M.

B.M. 7 ♂♂ type locality.

(*e*). Larger, F 13 mm. UpF discal spots faint or absent. ♂ with discal stigma reduced exactly as in *spuria*, of which it is probably the dry-season form. UnH with conspicuous black cell-spot.

Form **shanda** nov. : ♂ Kalaw, S. Shan States, 4200 ft., 9.viii.1926 (*H. C. Tytler*) : in B.M.

B.M. ♂ N. Shan States, Maymyo (18.ix.1931). 2 ♂♂ S. Shan States (type and 22.ix.1924).

The last two forms might be combined as a subspecies.

5*a*(3*b*). UnH veins not paler than the ground. F produced.

5 (6). ♂ upF with a conspicuous discal stigma as in *stigmata* : spots absent. UnH spots very small. May be a *stigmata* form and has very similar genitalia. F 12 mm.

piceus Leech, 1894 : ♂ Moupin : figured by Leech : in B.M.

B.M. 2 ♂♂ type locality. ♂ Szechuan, Kwansien.

6 (5). ♂ upF with a tiny whitened dash over mid vein 1. Uncus with very broad flat end, centrally indented. UpF spots faint.

jhora. 3 subspecies.

(*a*). UnH with bright greenish-yellow scaling, discal spots small, but conspicuous and compact. Cilia whiter than usual. F 12 mm.

Subsp. *jhora* De Nicéville, 1885 : ♂ Sikkim : type Calcutta Museum : figured : *Lep. Ind.* figures are very poor : Seitz figure is fairly good.

B.M. 25 ♂♂, 8 ♀♀ Sikkim.

(*b*). UnH with olive scaling, discal spots small and irregular. F 12–13 mm. Very variable.

Subsp. **creta** nov.: ♂ Khasia Hills, ix.1886 (*H. J. Elwes*): in B.M.: figured by El. & Edw., 1897, as *discreta*: ♀ figured by Seitz as *discreta*.

B.M. 25 ♂♂, 12 ♀♀ Assam. 36 ♂♂, 18 ♀♀ North Burma to Karens. ♂, ♀ Kuatun, 2300 m., Fukien, China. ♂ from Malaya, Fraser's Hill, 4000 ft., n Coll. Corbet.

(*c*). Small, F 11½ mm. UnH with olive scaling, discal spots broad and compact.

Subsp. **skola** nov.: ♂ Sumatra, Battak Mts., v.1894 (*L. Martin*): in B.M.

B.M. 17 ♂♂, 10 ♀♀ Sumatra (type locality: Scolak Daras: Korinchi, 4000 ft.).

7*a*(1*b*). Antennal club obtuse about thickest part, apiculus not at right angles: nudum 8 segments.

7 (8). ♂ upF with a black stigma as in *stigmata*, but the hind-wing veins 6 and 7 are normal. UpF the small white spots present or absent. Uncus as in *inachus*. F 13–14 mm.

propinquus. 2 subspecies.

(*a*). UnH markings as in *inachus* but the area between the two rows of white spots is filled with conspicuous black spots separated by white veins.

Subsp. *propinquus* Alpheraky, 1897 (June): ♂ Va-ssou-kuou. Figured by Leech as *inachus*.

syn. *chinensis* Elwes & Edwards, 1897 (October): ♂ Washan: in B.M.

syn. *thibetanus* Austaut, 1900: S.W. China.

B.M. 46 ♂♂, 7 ♀♀ W. China (Ta-tsien-lou and neighbourhood).

(*b*). UnH markings much reduced, consisting only of a black cell-spot, black spot mid space 7 white-edged and discal row of black-edged white spots. UpF and unF spotless.

Subsp. *tali* Evans, 1932: ♂ Tali, Haut Yunan: type B.M.

B.M. 27 ♂♂ W. China (Lotsekiang. Tsakou. Yunan).

8 (7). ♂ upF with small pale dash over mid vein 1. UpF spots very faint. Below marked as in *jhora*. Small, F 11 mm. Uncus as *jhora*, but much narrower.

dubius. 3 subspecies.

(*a*). ♂ F termen straight. UnH with dark ochreous scaling.

Subsp. *dubius* Elwes & Edwards, 1897: ♂ Peermaad: figured: type B.M. Figured *Lep. Ind.* and Seitz.

B.M. 35 ♂♂, 8 ♀♀ South India (Travancore to Coorg and Palnis).

(*b*). ♂ F termen convex. UnH with olive scaling and distinct markings.

Subsp. **impha** nov.: ♂ Imphal, Manipur, 2000 ft., 18.vi.1911 (*H. C. Tytler*).

B.M. 14 ♂♂, 10 ♀♀ type locality. 6 ♂♂, ♀ North Burma to Ataran. Yunan (Manao). 3 ♂♂, 2 ♀♀ Tonkin. 6 ♂♂, 8 ♀♀ Hainan.

(*c*). As *impha*, but unH markings very faint.

Subsp. *javanicus* Elwes & Edwards, 1897 : ♂ Java : figured : type B.M. Figured by Piepers & Snellen, as *discreta*, and by Seitz.
B.M. 4 ♂♂, 3 ♀♀ Java.

9*a*(1*a*). Antennae tip blunt, club straight, no real apiculus : nudum 8 segments. UpF spots very faint or absent. UnH similar to *jhora*, but markings often very faint : scaling olive. Very small, F 10 mm.

9 (10). ♂ with stigma as in *stigmata*, but much more raised and the unF is correspondingly channelled : on F vein 2 is displaced, but veins 6 and 7 on H are normal. Antennae = ½ costa as usual. Uncus slender, mushroom-like at end.

musca Mabille, 1876 : ♀ Luzon : type B.M. Figured in Seitz.

B.M. 8 ♂♂, 2 ♀♀ Philippines.

10 (9). ♂ without any trace of a stigma or the dash over vein 1. Antennae short, less than ½ costa. F 10 mm. Uncus slender, sides straight, end rounded.

pygmaeus. 2 subspecies (doubtfully separable).

(*a*). Generally paler and better marked.

Subsp. *pygmaeus* Fabricius, 1775, India.
B.M. 42 ♂♂, 23 ♀♀ South India (N. Kanara. Coorg. Nilgiris. Calicut. Mysore).

(*b*). Generally darker and poorly marked.

Subsp. *indistincta* Moore, 1878 : ♂ Salween, Burma : type B.M. Figured El. & Edw., *Lep. Ind.*, and Seitz.
B.M. 2 ♂♂ Chittagong. ♂, 2 ♀♀ Assam (Nagas, Khasi). 31 ♂♂, 17 ♀♀ Burma to Mergui. ♂, ♀ Siam (Peninsular Siam. Singla, Kampengpet). (♂ from Malaya, Perlis, in Coll. Corbet.)

NOTES ON THE GENUS *DIXEIA* TALBOT, WITH DESCRIPTIONS OF NEW FORMS (LEP. RHOP. PIERIDAE)

By G. Talbot, F.R.E.S.

Having arranged the material of this genus in the British Museum and in the Hope Dept. at Oxford, it was found that conceptions of the genus required amendment. It was found also that a number of forms seemed to require names; 16 new ones are described in the present paper. In the *Lep. Cat.* **53**, 16 species are listed. In the present paper only 7 are recognised. The chief modification has been made in the merging of the forms *doxo* (Godt.), *charina* (Bdv.), and *narena* (Gr.-Sm.) to form a single species possessing 11 subspecies. The genitalia and scent-scales of some of these forms have been studied by Dixey, 1918, *Trans. ent. Soc. Lond.* **1918** : 191–208. The taxonomic value attached to geographical variation has undergone some change in recent years, especially with increased knowledge of distribution.

The present paper comprises (*a*) Systematic List; (*b*) keys to the species and forms; (*c*) new subspecies and forms.

All references not given will be found in Talbot, 1932, *Lep. Cat.* **53** : 202–207; 1935, *id.*, **66** : 633–635.

The author is indebted to the Trustees of the British Museum, and to Professor G. D. Hale Carpenter of the University Museum, Oxford, for facilities accorded for study.

Abbreviations Used.

Fw.	Fore-wing.	S-m.	Submarginal.
Hw.	Hind-wing.	*Dc.*	Discocellular.
Ups.	Upperside.	*Udc.*	Upper discocellular.
Uns.	Underside.	*Mdc.*	Middle discocellular.
Gr.-col.	Ground-colour.	*Ldc.*	Lower discocellular.
P.-d.	Post-discal.	Nom.	Nominotypical.

Systematic List.

The letters B.M.T. placed after the name indicates that the type is in the British Museum (Natural History).

Forms described as new in the present paper are indicated by an asterisk.

1. *cebron* (Ward, 1871). B.M.T.

*♀ form *usitatus* Talb. B.M.T.
*♀ form *aurantiaca* Talb. B.M.T.

Ivory Coast to Cameroons.

2. *capricornus capricornus* (Ward, 1871). B.M.T.

Form *nusprica* (Suffert, 1904). B.M.T.
*♂ form *signata* Talb. B.M.T.

Ivory Coast to Cameroons.

capricornus falkensteini (Dewitz, 1879).

(♂ = *lindneri* (Dewitz), 1879).

Gaboon to Angola.

3. *dixeyi* (Neave, 1904).

Uganda; south-western Abyssinia.

4. *orbona orbona* (Geyer, 1832) (♀ = *larima* (Boisduval), 1836). ? B.M.T.

Senegal to Cameroons.

orbona vidua (Butler, 1899). B.M.T.

♀ form *nigricans* (Aurivillius, 1910).
♀ form *abyssinibia* (Strand, 1911). ? a *vidua* form.
♀ form *primulina* (Joicey & Talbot, 1921). B.M.T.
♀ form *griseovenata* (Neustetter, 1927).
♀ form *aurantium* (Ungemach, 1932).
♀ form *albida* (Ungemach, 1932).
♀ form *rubescens* (Ungemach, 1932).
*♀ form *semialba* Talbot. B.M.T.
*♀ form *semiochracea* Talbot. B.M.T.

Abyssinia, Sudan, Uganda, eastern Congo, Kenya, Tanganyika Territory, Katanga, Northern Rhodesia.

5. *pigea* (Boisduval, 1836).

Form *rubrobasalis* (Lanz, 1896) (♂ = *astarte* (Butler), 1900). B.M.T.
♀ form *vulgaris* (Ungemach, 1932). ? = *rubrobasalis*.
♀ form *pigea* (Boisd., 1836).
Dry-season form *alba* (Wallengren, 1857).
♀ form *saalmülleri* (Aurivillius, 1898). ? a *pigea* form.
♀ form *nitida* (Aurivillius, 1898).
♀ form *kueckeni* (Suffert, 1904). B.M.T.
♀ form *wagneri* (Suffert, 1904). ? a *pigea* form.
♀ form *lathyana* (Strand, 1909) (= *lathyi* (Hulstaert), 1924).
♀ form *elia* (Strand, 1911).
♀ form *leplaei* (Hulstaert, 1924).
♀ form *reducta* (Hulstaert, 1924).
♀ form *lutea* (Ungemach, 1932).
♀ form *rubritincta* (Ungemach, 1932) (? = *saalmülleri* (Auriv.)).
♀ form *citrina* (Romieux, 1934) (= *lathyi* (Ungem.), *non* Hulst.).
Pieris pigea ab. *citrina, Mitt. Schweiz. ent. Ges.* **16** : 140 (Belgian Congo).
*♀ form *citreus* Talbot. B.M.T.
*♀ form *erubescens* Talbot. B.M.T.
*♀ form *luteola* Talbot. B.M.T.
*♀ form *lutescens* Talbot. B.M.T.

South Africa to Abyssinia, west to Congo and Angola; Cameroons (rare).

6. *spilleri* (Spiller, 1884).

♀ form *gallenga* (Grose-Smith, 1887). B.M.T.
*♀ form *flavalba* Talbot. B.M.T.

Natal to Tanganyika Territory and eastern Kenya.

7. *doxo doxo* (Godart, 1819) (= *voltaensis* (Talb.), 1929). B.M.T.

Dry-season form *minor* (Talbot, 1929). B.M.T.

Western Sudan to Senegal, Haute Volta, Gold Coast (Northern Territory).

doxo venatus (Butler, 1871). B.M.T.

*Dry-season form *desertorum* Talbot. B.M.T.

South-western Abyssinia; southern Sudan.

doxo alberta (Grünberg, 1911).

Eastern Congo (Mpororo district) and north-western Tanganyika Territory.

**doxo costata* Talbot. B.M.T.

Northern Tanganyika Territory to western Kenya and northern Uganda.

doxo pulverulenta (Dixey, 1929).

Northern Kenya (Mt. Kulal).

doxo liliana (Grose-Smith, 1889). B.M.T.

Dry-season form *gerda* (Grose-Smith & Kirby, 1893). B.M.T.
*Dry-season form *transiens* Talbot. B.M.T.
*Wet-season form *immaculata* Talbot. B.M.T.
♂ form *nigropunctata* (Sharpe, 1890). B.M.T.
*♀ form *ochreata* Talbot. B.M.T.

Eastern Kenya.

doxo dagera (Suffert, 1904). B.M.T.

Form *anali* (Suffert, 1904). B.M.T.

Eastern Tanganyika Territory.

**doxo parva* Talbot. B.M.T.

*Dry-season form *inspersa* Talbot. B.M.T.

Rhodesia and Nyasaland.

doxo simana (Hopffer, 1857).

Portuguese East Africa.

doxo charina (Boisduval, 1836).

Dry-season form *anactorie* (Doubleday, 1842).

Natal and Cape Colony.

doxo narena (Grose-Smith, 1898). B.M.T.

Form *lambertoni* (Le Cerf, 1921).

Southern Madagascar.

Species removed.

Pinacopteryx helena Grose-Smith, 1898, *Nov. Zool.* **5** : 350 (♂, Kavirondo).

The type, in the Tring Museum, was kindly examined by Mr. F. W. Goodson, who states that it is a specimen of *Colotis elgonensis* (Sharpe, 1891).

Key to species of *Dixeia*.

Males.

1 (3). Ups. fw. basal area lemon-yellow.
2. Ups. fw. costal border darkened . . . . . *cebron* (Ward).
3. Ups. fw. basal area not coloured differently from rest of wing.
4(16). Ups. fw. entirely white, with a marginal dark border or marginal dots.
5(17). Uns. fw. without a p.-d. spot in area 3.
6 (9). Uns. fw. marginal spots well developed.
7 (8). Uns. fw. not orange at base. Uns. hw. yellowish-buff *capricornus* (Ward).
8. Uns. fw. orange-yellow at base . . . . . *dixeyi* (Neave).
9(11). Uns. fw. marginal spots small or vestigial.
10. Hw. marginal spots on ups. or uns. . . . . *orbona orbona* (Geyer).
11(12). Uns. fw. marginal spots usually absent.
12(14). Ups. fw. marginal narrow dark border rarely maculate.
13. Uns. hw. usually immaculate or with vestigial s.-m. spots *orbona vidua* (Butl.).
14. Ups. fw. a marginal row of vein-dots, sometimes anteriorly coalescent.
15. Uns. hw. marginal dots usually present, except in dry-season specimens *pigea* (Boisd.).
16. Ups. both wings lemon-yellow . . . . . *spilleri* (Spiller).
17(18). Uns. fw. usually a p.-d. spot in area 3.
18. Ups. fw. costal border and base of wing more or less darkened. Both wings with veins often darkened . . . . . *doxo* (Godt.).

Females.

(See separate keys to forms of *orbona* and *pigea*).

1 (8). Ups. fw. a prominent p.-d. spot in area 3, longer than broad, 3 to 5 mm. long, sometimes prolonged to cell.
2 (6). Ups. fw. marginal dark border usually continuous to tornus.
3. Ups. fw. usually without a subapical spot in area 5.
4 (5). Ups. fw. white or yellow . . . . . *cebron* f. *usitatus* Talb.
5. Ups. fw. orange . . . . . *cebron* f. *aurantiaca* Talb.
6. Ups. fw. marginal dark border usually maculate or at least broken in area 2.
7. Ups. fw. a subapical spot in area 5 and usually a small one in 6 *capricornus* (Ward).
8(15). Ups. fw. without a p.-d. spot.
9(10). Both wings with prominent marginal spots . . . . *dixeyi* (Neave).
10. Both wings without marginal spots.
11(14). Ups. lemon-yellow.
12. Uns. hw. ochraceous-yellow with s.-m. brown spots *spilleri* f. *spilleri* (Spiller).
13. Uns. hw. ochraceous-brown without s.-m. spots *spilleri* f. *gallenga* (Gr.-Sm.).
14. Ups. fw. white . . . . . *spilleri* f. *flavalba* Talb.
15. Ups. fw. a p.-d. spot in area 3, small and rounded, not reaching 3 mm. in diameter.

16(18). Small species; fore-wing 21–25 mm.
17. Ups. resembles male (fw. unmarked, with or without marginal narrow border or spots), or fw. veins darkened in marginal area. Fw. usually more or less dusky or else the p.-d. spot minute or vestigial; marginal border usually maculate . . . . . *orbona* (Geyer).
18. Large species; fw. 26–32 mm.
19. Ups. fw. usually not dusky, nor with veins darkened in marginal area.
20. Ups. fw. marginal border maculate; uns. often a basal red area *pigea* (Boisd.).
21. Ups. fw. marginal border continuous to tornus, or at least to vein 4, rarely maculate (dry-season specimens). Uns. never with basal red. Wings always white . . . . . *doxo* (Godt.).

Dixeia orbona (Geyer).

Key to ♀ forms.

1 (9). Ups. fw. white and more or less dusky.
2 (8). Ups. fw. without a rosy basal area.
3 (7). Ups. fw. the s.-m. spot in area 4 absent or vestigial.
4 (5). Ups. fw. cell usually darkened; no marginal vein-streaks. Hw. marginal spots prominent . . . . . *orbona* (Geyer).
5 (6). Ups. fw. usually with marginal vein-streaks, except in dry-season specimens. Hw. marginal spots usually absent or vestigial *vidua* (Butl.).
6. Ups. fw. much darkened. Hw. more or less darkened *nigricans* (Auriv.).
7. Ups. both wings dusky in basal half. Fw. with s.-m. spots in areas 3 to 6 . . . . . *abyssinibia* (Strand.).
8. Ups. fw. a rosy basal area; veins mostly dusky . . *griseovenata* (Neust.).
9(14). Ups. fw. white, not dusky, no marginal vein-streaks.
10(11). Uns. fw. basal area orange-red or orange-yellow . . *rubescens* (Ungem.).
11(12). Ups. hw. ochraceous . . . . . *semiochracea* Talb.
12(13). Ups. hw. lemon-yellow . . . . . *semialba* Talb.
13. Ups. both wings white . . . . . *albida* (Ungem.).
14(15). Ups. both wings primrose-yellow . . . . . *primulina* Talb.
15. Ups. both wings orange to ochraceous-yellow. Fw. basal area more or less orange-red . . . . . *aurantium* (Ungem.).

Dixeia pigea (Boisd.).

Key to ♀ forms.

1(16). Ups. fw. gr.-col. white to yellowish-white.
2(12). Uns. fw. a basal red area.
3 (9). Ups. fw. a basal rosy area showing through from uns.
4. Ups. fw. basal red area not extended beyond cell.
5 (8). Uns. hw. ochraceous-yellow.
6 (7). Both wings marginal spots small *rubrobasalis* (Lanz); *vulgaris* (Ungem.).
7. Both wings marginal spots large, more or less united on fw. *kueckeni* (Suff.).
8. Uns. hw. pearly-white . . . . . *nitida* (Auriv.).
9. Ups. fw. with basal red scaling, extending over the cell.
10(11). Ups. fw. basal red not extended beyond cell *rubritincta* (Ungem.); *saalmülleri* (Auriv.).
11. Ups. fw. basal red extended beyond the cell . . . . *erubescens* Talb.
12(13). Uns. fw. basal area orange-yellow. Hw. ochraceous-yellow in distal area . . . . . *wagneri* (Suff.).

13. Uns. fw. basal area of the gr.-col.
14(15). Uns. hw. ochraceous-yellow or white . . . . . *pigea* (Boisd.).
15. Uns. hw. lemon-yellow . . . . . *citreus* Talb.
16(24). Ups. fw. lemon-yellow.
17(23). Fw. with basal red or orange.
18(19). Ups. basal areas orange-yellow . . . . . *elia* (Strand).
19(22). Uns. fw. a basal orange area.
20(21). Both wings with prominent marginal spots . . . . *leplaei* (Hulst.).
21. Both wings with marginal spots vestigial or absent . . *reducta* (Hulst.).
22. Fw. on both sides with basal area red . . . . . *lutea* (Ungem.).
23. Fw. without basal red or orange . . . . . *citrina* (Romieux).
24. Ups. ochraceous-orange to orange-red.
25(26). Ups. ochraceous-orange; marginal spots prominent . . . *luteola* Talb.
26. Ups. orange to orange-red. Hw. marginal spots vestigial or absent *lathyana* (Strand).

New subspecies and forms of the genus *Dixeia* Talbot.

Dixeia cebron (Ward) ♀ form **usitatus** f. n.

Pieris capricornus Aurivillius (*non* Ward), 1910, *in* Seitz, *Macrolep. World* **13** : 45, t. 14*b* (♀).

♀. Ups. fw. lemon-yellow or white; cell blackish-brown; a large, p.-d., round, blackish-brown spot in area 3; an inner blackish-brown stripe filling areas 1*a* and 1*b* from base to near tornus; marginal dark border broader from apex to vein 4, much narrower from vein 4 to tornus, its edge even along the broader part, but below vein 4 it is more or less dentate on the veins; spot in area 3 sometimes joined to cell-stripe; some specimens have a subapical spot as in *capricornus* female. Hw. lemon-yellow to whitish, sometimes suffused with dusky scaling; a s.-m. series of well-defined spots; a marginal row of round spots, larger than the s.-m. ones.

Uns. fw. white; apical and basal areas more or less tinged greenish-yellow; marginal row of small rounded spots; other markings as on ups. but reduced. Hw. pale ochraceous-yellow; marginal spots usually larger than on fw.; s.-m. spots present in areas 1*c* to 6.

Habitat.—Ivory Coast (type). Both sexes from Gold Coast, Nigeria, Ashanti and Cameroons. One pair *in cop.* from Ashanti.

The female of the allied *capricornus* (Ward) is very similar, but usually larger, and on fw. ups. with a subapical black spot.

Dixeia cebron (Ward) ♀ form **aurantiaca** f. n.

Pieris cebron Aurivillius, 1910, *in* Seitz, *Macrolep. World* **13** : 45, t. 14*c*.

♀. Ups. fw. orange-yellow; a short apical cell-streak; p.-d. spot smaller than in *usitatus*; a similar p.-d. spot below vein 2, divided by vein 1*a*; dark marginal border as in the allied form, but posteriorly its edge only feebly dentate. Hw. white without dusky scaling; s.-m. and marginal spots as in allied form.

Uns. fw. orange-yellow; p.-d. spot in area 3 well defined, other markings vestigial. Hw. white with yellow tinge on inner and outer areas; area 8 orange-yellow; s.-m. spots as on ups.; marginal spots minute.

Habitat.—One specimen (type) without locality, ex Coll. C. Ward (via Coll. Oberthür), and figured in Ward (1873, *African Lep.* pl. iii, figs. 4, 5, Cameroons). Also 1 ♀, "Cameroons" (ex Coll. Grose-Smith).

The Grose-Smith specimen has reduced black markings on fw.; below vein 4 the marginal border is broken up into spots as in the female of *capricornus*;

p.-d. spot small and more rounded; no cell mark. Hw. tinged yellow. Uns. as in the type.

Dixeia capricornus (Ward) ♂ form **signata** f. n.

♂. Differs from the nom. form only on the uns. Fw. a p.-d., small, round spot in area 3; occasionally also a smaller spot in area 1*b*, just below vein 2. Hw. paler than in most specimens of the nom. form; p.-d. small spots in areas 1*c*, 2 to 6, those in 3 and 5 more distinct, the one in 4 vestigial, the others usually minute.

Habitat.—Gold Coast, Enchi (*Capt. B. D. Peake*) (type); Ivory Coast, Dimbrok (*I. Dyot*, 1914), 1 ♂; Ashanti, Coomassie, 3 ♂.

Dixeia orbona vidua (Butler) ♀ form **semialba** f. n.

♀. Ups. fw. white or yellowish; a marginal narrow border and prominent p.-d. small spot in area 3 as in other forms. Hw. lemon-yellow with marginal dots.

Uns. fw. white; apical area ochraceous-yellow; p.-d. spot as on ups.; trace of a smaller p.-d. spot below vein 2. Hw. of same colour as apex of fw.; s.-m. and marginal vestigial dots.

Habitat.—Kenya: Lumbwa, 5.vii.1923 (*G. W. Jeffery*) (type); *id.*, 27.xi.1921, 1 ♀.

A form similar to this occurs in *pigea* (Boisd.).

Dixeia orbona vidua (Butler) ♀ form **semiochracea** f. n.

♀. Ups. fw. white, basal area slightly rosy; outer margin tinged yellow; apex narrowly darkened; five small marginal spots; p.-d. small spot in area 3. Hw. ochraceous-yellow; marginal dots minute; veins white.

Uns. fw. white; cell orange to beyond middle; apical area ochraceous-yellow; p.-d. spot as above. Hw. ochraceous-yellow; s.-m. and marginal dots minute; area 8 orange; some orange suffusion below cell.

Habitat.—S.E. Congo: Katanga, Lufira Valley, Kikura River, 5.v.1919 (*T. A. Barns*) (type). Northern Rhodesia, Chosi River, 20.viii.1916 (*T. A. Barns*), 1 ♀.

The last-mentioned specimen has fw. markings vestigial on ups.

Dixeia pigea (Boisduval).

The nom. form represents the normal wet-season form. The extreme wet-season form is represented by *rubrobasalis* (Lanz), of which *astarte* (Butl.) is the male; *kueckeni* (Suff.) is a slightly differentiated ♀ form. The dry-season form is *alba* (Wllgr.).

The female holotype of *pigea* was not found in Coll. Oberthür; the single specimen from Coll. Boisduval does not agree with the original description.

Although the female of *pigea* is represented by at least fifteen forms, the male does not appear to be geographically variable.

Dixeia pigea (Boisduval) ♀ form **citreus** f. n.

♀. Ups. fw. white; dark markings heavy or slight; type and another with basal dusky area to end of cell, filling area 1*b* to the p.-d. spot, and area 1*a* to the tornus; marginal dark maculate border with spots on veins 1*a*, 2, 3 and 4; a wider apical border. Hw. ochraceous-yellow to lemon-yellow, with the usual marginal spots.

Uns. fw. white, yellowish at base; apical area ochraceous-yellow; marginal dots; p.-d. spots in areas 3 and 1*b*, sometimes vestigial. Hw. ochraceous-yellow; s.-m. and marginal spots more or less defined.

Habitat.—KENYA: Sagalla, 9.i.1915 (*K. St. A. Rogers*) (type); Dabida, 3500 feet, 16.xii.1901 (*K. St. A. Rogers*), 1 ♀; also in Hope Dept. from Sagalla, 5 ♀. TANGANYIKA TERRITORY: Mhonda, 1 ♀; Usambara, 3 ♀. UGANDA: Kumi (*H. B. Morony*), 1 ♀ in Hope Dept. (fw. with a yellow tinge on both sides); Kakindu Hill, 1° 10′ S., 31° 30′ E., 1.v.1915 (*G. D. H. Carpenter*), 1 ♀ in Hope Dept.

Dixeia pigea (Boisduval) ♀ form **luteola** f. n.

Pinacopteryx astarte Butler, 1900, *Proc. zool. Soc. Lond.* **1899**: 971, pl. lxx, fig. 7 (♀, Tana River).

♀. Somewhat resembles *lathyana* (Strand, 1909) but is larger and more strongly marked and probably represents a wet-season phase.

Ups. ochraceous-orange to ochraceous-yellow. Fw. with or without basal orange-red suffusion; dark marginal border or marginal spots; p.-d. spot in area 3. Hw. s.-m. spots prominent.

Uns. somewhat paler. Fw. usually with basal orange-red area or this area of a deeper yellow; marginal dots small or vestigial. Hw. marginal spots smaller than on ups.; s.-m. dots few and indistinct.

Habitat.—TANGANYIKA TERRITORY: M'Pala (*R. P. Guillemé*) (type). KENYA: Tana River (♀ described by Butler, *loc. cit.*); "Brit. E. Afr.," 1 ♀ (paler ochraceous). UGANDA: Eastern Busoga, 3800–4000 feet, 28.vii.–1.viii.1911 (*S. A. Neave*), 1 ♀. CONGO: Near Elizabethville, 4.iii.1926 (*Major F. G. Jackson*), 1 ♀; "Congo," 1 ♀ (paler ochraceous); Ribé (ex Coll. Ward), 1 ♀ (paler ochraceous). RHODESIA: North-western Rhodesia, Chisanga, 27° 22′ E., 13° 32′ S., 14.v.1915 (*H. C. Dollman*), 1 ♀; Northern Rhodesia, Chosi River, 12.x.1917 (*T. A. Barns*), 1 ♀; Ndola, 3.vi.1938 (*R. W. Barney*), 2 ♀; Luanshya, 17.iii.1938 (*R. W. Barney*), 1 ♀; *id.*, 15.xii.1940 (*R. W. Barney*), 1 ♀.

Dixeia pigea (Boisduval) ♀ form **lutescens** f. n.

♀. Ups. creamy-white tinged yellow. Fw. marginal spots prominent as in typical white form. Hw. marginal dots sharply defined; outer margin narrowly bordered yellow from vein 1*a* to vein 4 at least.

Uns. hw. and apical area of fw. ochraceous-yellow.

Habitat.—South-western Uganda: Kakindu Hill, 1° 10′ S., 31° 30′ E., on a grassy plain, 13.vii.1915 (*G. D. H. Carpenter*) (type); Kigezi district, 3000–3200 feet, near mouth of Ntungwe River, Lake Edward, 19–24.ix.1922 (*G. D. H. Carpenter*), 1 ♀.

Dixeia pigea (Boisduval) ♀ form **erubescens** f. n.

♀. Ups. creamy-white. Fw. marginal narrow border continuous or maculate; basal red area usually appearing from uns. Hw. usually immaculate.

Uns. dark markings not prominent. Fw. with extensive basal orange-red area including all or most of the cell; sometimes some scattered red scaling over distal area of wing. Hw. yellowish or distinctly pale yellow.

Habitat.—UGANDA: Kerinya Peninsula, 2 miles south of Jinja, Usoga, 16–31.i.1911 (*G. D. H. Carpenter*) (type). KENYA: Mau Escarpment; Nairobi

district; Mt. Kenia; Kikuyu; Sagalla (one), 11 ♀. All in the Hope Dept. In the Brit. Mus. from Hoyesbridge, iv–v.1930 (*Mrs. E. Barns*), 1 ♀ (damaged).

Apparently a dry-season form. Similar to *rubrobasalis* (Lanz), in which, however, the dark markings are much more developed. In the Hope Dept. there is a specimen taken *in cop.* with a dry-season male.

Dixeia spilleri (Spiller) ♀ form **flavalba** f. n.

♀. Similar to *gallenga* (Grose-Smith), which has heavier dark markings and is dull ochraceous. The nom. ♀ is yellow like the ♂.

Ups. fw. greyish-white or with a yellow tinge; outer border about twice as wide as in ♂, wider than in typical ♀, and continuous to tornus; rarely a vestigial p.-d. spot in area 3, and traces of subapical spots in 5 and 6; costal border darkened in some specimens. Hw. very pale greenish-yellow, or dull white with basal yellow; outer marginal spots usually present, but diffuse and sometimes absent.

Uns. dull white to creamy-white, fw. lighter. Fw. with apical yellow tinge and basal yellow suffusion. Hw. with slight basal yellow suffusion and p.-d. dark spots as in typical ♀.

Habitat.—Kenya: Voi district, 8–10.ii.1912 (*S. A. Neave*) (type, taken *in cop.*). Also a series from the same area in both the Brit. Mus. and Hope Dept.

Dixeia doxo venatus (Butler) form **desertorum** f. n.

This is the dry-season form.

♂. Ups. fw. marginal black reduced; basal black scaling absent or reduced. Hw. marginal spots absent or vestigial.

Uns. fw. with or without apical dull ochraceous suffusion; p.-d. dot in area 3; veins not darkened. Hw. white or yellowish; veins not darkened; no markings or vestiges of p.-d. and marginal spots.

♀. Ups. creamy-white or slightly ochraceous. Fw. outer border usually brownish; p.-d. spot smaller; basal dark scaling usually absent or slight. Hw. veins not darkened; marginal dots may be present.

Uns. hw. and fw. apical area, darker or paler brownish-ochraceous; veins not darkened; dark markings more distinct than in ♂ but may be quite absent in pale specimens; darker specimens with hw. p.-d. line prominent.

Habitat.—Sudan: District of the White Nile (*G. B. Longstaff*) and Nuba Mtns. chiefly. Types in Hope Dept., and a long series of both seasonal forms. In the Brit. Mus. one ♀ from White Nile, 6° 8′ N., Malek, 11.ii.1912 (*G. B. Longstaff*).

Dixeia doxo liliana (Grose-Smith).

Dry season form **transiens** f. n. and wet season form **immaculata** f. n.

This pair of forms seems to represent a *charina*-like race that flies with typical *liliana*. The forms *liliana* (f. typ.), *gerda* and *transiens*, and also the ♀-f. *ochreata* all occur at Voi. F. *transiens* appears to be rare, for there are only three specimens in the Brit. Mus.

Dry-season form *transiens*.

♂. Ups. resembles *charina* (Boisd.). Fw. with a more prominent spotted marginal border, much narrower than in f. *gerda* (Smith & Kirby), the apex black to vein 7, and a row of four or five small spots on veins 2 to 6.

Uns. fw. usually with a p.-d. spot in area 3; both wings usually with a *dc* dot. Hw. as in *charina* dry form.

♀. Ups. fw. outer dark border heavier than in male, the spots composing it forming a continuous band; p.-d. spot somewhat larger than in *charina*.

Uns. hw. and apical area of fw. pale brownish-ochraceous, not blackish-ochraceous as in *charina*.

Wet-season form *immaculata*.

♂. Ups. as in the dry phase. Uns. unmarked except for a minute *dc* dot on hw.

♀. Very similar to *charina*. Ups. fw. with dark markings heavier. Uns. somewhat as in *gerda* (Smith & Kirby). Hw. and apical area of fw. pale ochraceous-yellow. Fw. p.-d. spot absent or vestigial.

Habitat.—Eastern Kenya; north-eastern Tanganyika Territory. Form *transiens.*—KENYA: Mukaa Hills, about 30 miles east of Machakos, *c.* 5800 feet, 9.vi.1908 (*K. St. A. Rogers*) (♂ type, in Hope Dept.); *id.*, 12.vi.1908 (♀ allotype, in Hope Dept.); *id.*, 19.iii.1909, 1 ♀ in Hope Dept. Thiba River, between Embu and Fort Hall, *c.* 4200 feet, 10.ii.1909 (*K. St. A. Rogers*), 1 ♂ in Hope Dept. Voi Plantations, 2.iii.1912 (*C. Montague Smyth*), 1 ♂ in Brit. Mus.; *id.*, 10.ii.1912, 1 ♂ in Brit. Mus.; Tana River, Maranga, 3800 feet, 16.i.1899 (*R. Crawshay*), 1 ♂ in Brit. Mus. The three latter specimens are somewhat like *simana* (Hopffer), but with fw. border slightly heavier and *dc* dot on both wings more prominent. TANGANYIKA TERRITORY: Kiwanga, April, 1901 (ex Coll. Brodie), 1 ♂ in Hope Dept.

Form *immaculata.*—Kenya: Mombasa Island, sea front, 3.vi.1919 (*G. D. H. Carpenter*), 1 ♂; *id.*, 10.vi.1919 (♂ type); *id.*, 8.vi.1919, 1 ♂; *id.*, 3.vi.1919 (♀ allotype). All in Hope Dept.

Dixeia doxo liliana ♀ form **ochreata** f. n.

♀. Markings as in f. *liliana* (Gr.-Sm.). Ups. pale ochraceous-yellow.

Uns. pale ochraceous, with or without speckling characteristic of dry-season forms.

Habitat.—KENYA: Voi, 8–10.ii.1912 (*S. A. Neave*) (type and two others); Taveta, 1 ♀. In Brit. Mus. In Hope Dept. from Rabai and Jilore, 3 ♀. TANGANYIKA TERRITORY: Morogoro, 1 ♀ in Brit. Mus. Also in Brit. Mus. 1 ♀ labelled "Natal".

Dixeia doxo costata subsp. n.

♂. Ups. resembles the subspecies from Nyasaland and Rhodesia; veins darkened. Fw. with basal dusky scaling more or less developed, at least below cell; marginal border narrow, reaching to vein 3. Hw. without marginal spots or with faint dots.

Uns. white. Fw. as in the Nyasaland subspecies but *dc* dot and p.-d. spot more strongly developed. Hw. somewhat as in *alberta* Grünb.; veins not edged black, only darkened; a p.-d. line as in *alberta* but more maculate, accentuated in areas 6 and 7, and more or less developed; median dusky stripe, from base to p.-d. line on vein 4, more or less distinct; a *dc* dot; marginal dots absent or vestigial.

♀. Ups. similar to the Nyasaland subspecies. Fw. marginal border broader in specimen from Tanganyika Territory, almost touching p.-d. spot; basal dusky scaling more strongly developed than in specimens from Nyasaland.

Uns. fw. buff-white, more yellow over apical area. Hw. pale ochraceous. Markings of both wings as in male.

The dry-season form is not well differentiated. Ups. with the usual reduction of black markings and black scaling. Uns. hw. and fw. apical area more or less ochraceous with more or less brown speckling.

Habitat.—Tanganyika Territory: District of Great Craters, Kondoa Irangi, 4000 feet, February and March 1921 (*T. A. Barns*), 2 ♂, 8 ♀ (wet f.), 1 ♀ (dry f.) (♂♀ types, March); Kassanga, Lake Tanganyika, 2 ♂. Kenya: S. Kavirondo, Upper Kuja Valley, 4200 feet, May 1911 (*S. A. Neave*), 3 ♂ (wet f.), 3 ♀ (dry f.); Mumias, Kisumu Road, 3800–4800 feet, June 1911 (*S. A. Neave*), 1 ♀ (wet f.); Port Ugowe, 23.ii.1900 (*H. Johnston*), 1 ♀ (dry f.); Fort Hall to Embu road, 5000 feet, February 1911 (*S. A. Neave*), 1 ♀ (dry f.); Nairobi to Fort Hall road, 4500–5000 feet, January 1911 (*S. A. Neave*), 2 ♀ (dry f.); Muthambi River, Maranga, 4500 feet, 10.i.1899 (*A. Crawshay*), 1 ♀ (dry f.). Uganda: Victoria Nile, near Masindi, 3400 feet, 20–22.xii.1911 (*S. A. Neave*), 4 ♂ (dry f.); Semliki Plains, near S. shore of Lake Albert, 2200 feet, 25–27.xi.1911 (*S. A. Neave*), 1 ♂ (wet f.); "Victoria Nyanza," 2 ♂ (wet f.); Ripon Falls, 7.xi., 1 ♀ (wet f.); Jinja, 3800 feet, July 1911 (*S. A. Neave*), 1 ♀ (dry f.); "Uganda," 1 ♀ (extreme dry f.).

Dixeia doxo parva subsp. n. and form **inspersa** f. n.

Wet-season form *parva*.

♂. Ups. resembles *liliana* Gr.-Sm., with similar darkened veins and basal dusky scaling. Fw. dark border somewhat narrower, its edge straight, not crenulate as in *liliana*.

Uns. resembles form *gerda* Sm. & Kby. Fw. p.-d. spot in area 3 vestigial or absent. Hw. unmarked or with traces of s.-m. markings. Both wings with a distinct *dc* dot.

♀. Somewhat resembles paler specimens of *gerda*. Ups. fw. p.-d. spot in area 3 smaller; spot on inner margin usually absent, otherwise vestigial. Hw. without s.-m. markings; marginal spots small or absent.

Uns. fw. white; apical area yellowish; p.-d. spot small, rarely as large as in *liliana* forms. Hw. white, more or less tinged ochraceous; markings as in *liliana* but fewer.

Length of fw.: ♂♀, 21–23 mm. In *liliana* ♂♀, 23–27 mm.

Dry-season form *inspersa*.

♂. Ups. veins usually much less darkened than in wet form. Fw. dark border usually brownish-black; basal and costal dusky scaling slight.

Uns. fw. p.-d. spot small and diffuse as in some females of wet form; *dc* dot as in wet form; apical area finely speckled with ochraceous-brown. Hw. as apical area of fw., some specimens less strongly speckled than others; s.-m. small spots more or less distinct; *dc* dot as in wet form.

♀. Ups. with slight yellow tinge. Fw. markings as in wet form; marginal border somewhat narrower. Hw. usually unmarked or with marginal dots.

Uns. resembles the ♂.

Habitat.—Northern and Southern Rhodesia: wet form, 9 ♂, 5 ♀; dry form, 12 ♂, 11 ♀ (? in this area 3 females labelled "Taguela"). Nyasaland: wet form, 5 ♂, 2 ♀; dry form, 9 ♂, 3 ♀.

Form *parva*, ♂ holotype: S. Rhodesia, Lomagundi, 11.ii.1908 (*H. R. Stevenson*); ♀ allotype: Mashonaland, Umtali, December 1900 (*G. A. K. Marshall*).

Form *aspersa*, types: Mashonaland, Umtali, August 1908 (*Miss Fountaine*).

LESTES ALBOFASCIATA: A NEW SPECIES OF ODONATA FROM BURU ISLAND

By Lt.-Col. F. C. Fraser, I.M.S. Retd., F.R.E.S.

In the course of writing a monograph on the Legion *Lestes* Selys, I made a critical examination of my large collection of species from the Oriental region, and found among them a specimen labelled "Buru, Forster", which is undoubtedly a species new to science. This specimen was passed on to Dr. Laidlaw, I believe, some years ago, and I had formerly misread the label as "Borneo".

This new species belongs to the large complex *praemorsa* which, I find, falls naturally into two sections according to whether the pectus of thorax and, more especially, the ventro-lateral border of the metepimeron is spotted with black or not. The new species belongs to the first category which includes not only species from the Orient, but also a small Ethiopian section, viz. *L. simulatrix* McLachlan, *L. tridens* McLachlan, *L. simulans* Martin and *L. pruinescens* Martin. The latter is, I think, merely the very adult form of *L. simulatrix* from Madagascar, or its continental form. I have named the new species *L. albofasciata* from the unique pale bluish-white fascia which traverses each side of the thorax, and its description follows :—

Lestes albofasciata sp. n.

Male. Abdomen 36 mm. Hind-wing 23 mm. (♀ unknown). Head: labium pale yellow, labrum, bases of mandibles and genae pale turquoise blue; ante- and post-clypeus black, the latter with a submedial spot of blue on each side; rest of head dull black, including behind the eyes, save for a small quadrate spot of yellow bordering the outer side of each lateral ocellus. Prothorax pale bluish with a broad middorsal black stripe, the median suture anteriorly yellow just behind the anterior lobe. Laterally a narrow black stripe broadening and forking deeply anteriorly. Thorax pale bluish-white marked very broadly with sharply defined coal-black stripes and areas, that on the dorsum being dark blue metallic. Mid-dorsum with the conventional *praemorsa* crenulate stripes which, however, are confluent in the middle line and broader than in any other known species, extending in places almost to the humeral suture and the indentations much flattened out. Laterally a small black spot on the superior end of humeral suture, another adjacent to the lower end of this suture, a small spot on the spiracle and the whole of the lower sides and beneath. The upper anterior limit of this black fascia is very clearly defined and begins just at the level of the incomplete suture; a small spot of the ground-colour and some irregular ungulate indentations posteriorly are the only relief to this extensive black area (fig. 1). Legs very long and slim, yellow with narrow black stripes on the outer and extensor surfaces of femora, broad and confluent apically on the anterior pair. Wings hyaline: 13 and 15 postnodals in fore-wings, 14 and 15 in the hind pair. Pterostigma black, rather short, scarcely more than twice as long as broad, covering 2 cells, distal and proximal sides equally oblique. Abdomen black on dorsum, blue laterally and beneath, the black as a quadrate spot on dorsum of segment 1, not quite extending to apical border of segment, a broad thistle-head-shaped stripe on dorsum of segment 2, not quite extending to base of segment where a broadish blue annule thus separates the two first segments; segments 3 to 6 with narrow black apical rings and black dorsal bands which taper to a

point basally and broaden subapically to form broad subapical annules narrowly connected to the apical ones; segment 7 with a basal blue ring covering about one-fourth the

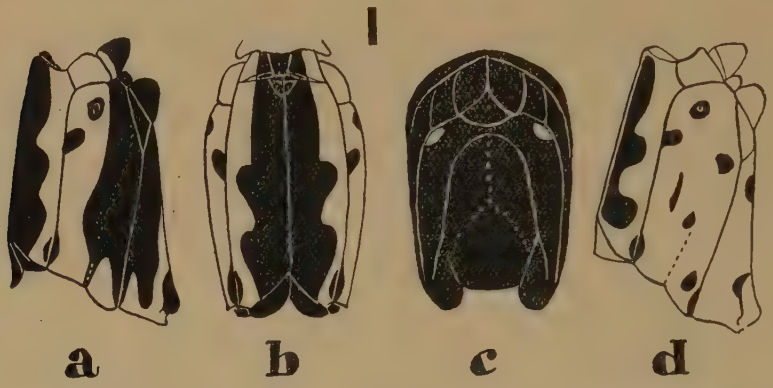

Fig. 1.—*Lestes albofasciata* sp. n. a. Right lateral view of thorax. b. Dorsal view of thorax. c. Pectus. d. *Lestes praemorsa* Selys, right lateral view of thorax to contrast with a.

segment; segments 8 to 10 entirely black. Anal appendages: superiors *entirely pale creamy yellow*, shaped very similar to those of *praemorsa* typica, about half as long again as segment 10, the inner plate narrower than in *praemorsa* and rather abruptly expanded

Fig. 2.—*Lestes albofasciata* sp. n. Dorsal view of tenth segment and anal appendages of male.

at the apical end which is very finely dentate. Apices evenly incurved and with a few bordering spines. Inferiors brownish, pale yellow at base and extreme apex, broad at base, mammilated at apex, not extending as far as the inner basal spine of superiors (fig. 2).

Habitat: Buru. The type will be deposited in the British Museum. The late Dr. Ris mentions specimens of *L. praemorsa* from Buru (1929, *Treubia*, **7** (Suppl.) : 141), but states that they do not differ from those from Sumatra. He mentions, however, that the superior anal appendages are entirely pale and that the pterostigma is shorter and blacker than usual, thus these may represent the sub-adult state of this new species. Owing to the extensive black fascia, it is impossible to say whether the usual ventro-lateral black spots on the lower border of metepimeron common to the first section of *praemorsa* are present or not.

MYRMECOLOGICAL GLEANINGS

By Horace Donisthorpe, F.Z.S., F.R.E.S.

In the course of work during the last twelve months the following myrmecological matters, to which attention should be called, have come to notice.

Formicidae.

Ponerinae.

1. *Ponera tortuolosa* Smith, 1858, *Cat. Hym. Brit. Mus.* **6** : 99, ☿, and *Ponera tortuolosa* Smith, 1863, *Journ. Proc. Linn. Soc. Lond. Zool.* **7** : 18, ☿♀. The first species, from Brazil, belongs to the subgenus *Gnamptogenys* Roger of *Ectatomma* Smith, and the second, from Ceram, is a subspecies of *Diacamma rugosum* Le Guil. Nevertheless as they were both originally described as *Ponera tortuolosa*, the latter insect requires a new name, for which I propose **D. rugosa** Le Guil, subsp. **smithi** nom. n.

2. *Rhytidoponera* (*Rhytidoponera*) *hilli* Crawley, 1915, *Ann. Mag. nat. Hist.* **15** : 131, ☿, and *Rhytidoponera* (*Chalcoponera*) *hilli* Clark, 1941, *Mem. Nat. Hist. Mus. Melbourne* **12** : 85, ☿, both from Australia. For the latter species I propose the name **R.** (**C.**) **clarki** nom. n.

Myrmicinae.

3. *Acromyrmex* (*Acromyrmex*) *nobilis* Santschi. Santschi, in 1939, described this species twice, though not entirely in the same words, on four workers taken in Brazil. The descriptions may be found in " Études et Descriptions de Fourmis néotropiques," 1939, *Rev. Ent. Rio de J.* **10** : 317; and " Résultats

Scientifiques des Croisières du Navaire—École Belg. 'Mercator,'" 1939, *Mem. Mus. Hist. nat. Belg.* (2) **15** : 164. I have ascertained that the former paper was published a few months earlier than the latter, therefore the original description occurs in the Rio de Janeiro publication.

FORMICINAE.

4. *Formica fervens* Drury, 1782,[1] *Ill. Nat. Hist. Ins.* **3** : 58, pl. 42, fig. 3, ♀, from Mexico, and *Formica fervens* Smith, 1857, *Journ. Proc. Linn. Soc. Lond. Zool.* **2** : 55, ☿, from Borneo. The former is an *Atta*, most probably *A. cephalotes* L., and the latter is a *Camponotus* (*Tanaemyrmex*) species, for which I propose the name **C. (T.) fervidus** nom. n.

5. Stitz, 1923, *Sitzber. Ges. naturf. Fr. Berlin* : 136, described a variety of *Polyrhachis* (*Myrmothrinax*) *thrinax* Roger under the name of *castanea* var. n. Santschi, 1928, *Tijds. v. Entom.* **71** : 140, sank this and renamed it *castanella* nom. n., because he said Stitz had already used the name *castanea* on page 128 of the same publication. On looking this up, I found that the insect described was not a *Polyrhachis* at all but *Camponotus* (*Myrmocantha*) *castanea* sp. n. Santschi's name *castanella* therefore sinks, but Stitz's name still sinks as there is a *Camponotus castaneus* Latreille, 1802, *Hist. Nat. Fourmis* : 118. I propose the name **castanicolus** nom. n., for Stitz's species.

6. *Echinopla rugosa* Er., André, 1891, *Mem. Soc. zool. France* **5** : 47, ☿, from Borneo, and *Echinopla rugosa* Stitz, 1938, *Sitzber. Ges. naturf. Fr. Berlin* : 110, ☿, from New Guinea. I propose the name **E. corrugata** nom. n. for the latter insect.

7. *Introduced Ants* :—In "British Ants" (2nd edn. 1927, p. 386), I gave a list of eleven ants enumerated by Forel as having become cosmopolitan, being introduced everywhere by shipping, and pointed out that all of these except three species had been found in Britain. Since this was written one of these three—*Solenopsis geminata* F.—has been found in some numbers in the propagating pits in Kew Gardens in 1932, both the winged sexes and also workers being present. Last year a certain number of workers of the first species in the list—*Odpotomachus haematodes* L.—were taken in a hot-house in Kew Gardens. This leaves only one species, *Mommorium floricola* Jerdon, to complete the series in this country.

Crustacea.

Isopoda.

8. *Platyarthrus hoffmanseggi* Brandt. J. L. Brooks in a paper—"Notes on the Ecology and the Occurrence in America of the Myrmecophilous Sowbug *Platyarthrus hoffmanseggi* Brandt," 1942, *Ecology* **23** : 427–37—records the first capture of this European myrmecophilous woodlouse in ants' nests in Connecticut. As the author suggests, it was probably accidentally introduced from Europe. Of the various experiments carried out by the author, the only definite result obtained was that *Platyarthrus* is attracted towards formic acid vapour, while *Oniscus asellus*, a non-myrmecophilous species, tends to avoid it.

[1] Emery (1922, *Gen. Ins.* **174c** : 352) incorrectly quotes the date as "1872".

THE FORMS OF *ELYMNIAS HYPERMNESTRA* (L.) (LEP. RHOP.) IN THE MALAY PENINSULA

By A. Steven Corbet, D.Sc., Ph.D., F.I.C., F.R.E.S.

(*British Museum, Natural History.*)

The oriental butterfly, *Elymnias hypermnestra* (Linnaeus, 1758), is of particular interest in that, in certain parts of its range, the females are orange-red, when they bear a close resemblance to *Danaus plexippus* (Linnaeus, 1758) and *D. melanippus* (Cramer, 1777) when in flight. These orange-red females occur from Ceylon to Sikkim and Burma, and across Siam to south Annam and to Kedawi (in north Malaya), and in Java. In Formosa, south China, Hainan, Tonkin and central Annam, and then in Malaya proper, Sumatra and Borneo, in the Philippines, and then across the Lesser Sunda Islands to Timor, the females have the upperside blackish-brown, with a blue submarginal fascia on the fore-wing, and differ from the males chiefly in the lighter ground-colour. There are no records of this common species occurring in any of the islands off the west coast of Sumatra. I know of no other species of Rhopalocera showing such a distribution of two distinct female forms although, perhaps, it should be pointed out that some species of *Arhopala* Boisduval (Lycaenidae) present a somewhat parallel case in that the races from Burma and Java are very similar and have the upperside bright shining blue, while the intervening races from Malaya, Sumatra and Borneo have a dull purple upper surface.

It has been pointed out elsewhere (Corbet, 1941, *Proc. R. ent. Soc. Lond.* (A) **16 :** 101) that the north-west corner of British Malaya (Kedawi) pertains to a faunistic area which is different from that of Malaya proper and that, in a number of Malayan species of Rhopalocera, the Kedawi race is distinct from that of Malaya proper. The race of *E. hypermnestra* with orange-red female found in Kedawi may be referred to the Burmese subspecies *tinctoria* Moore, 1879, in which the upperside of the hind-wing is orange-red or white. In Malaya proper, on the mainland south of Penang, the subspecies is *beatrice* Fruhstorfer, 1902. This butterfly is rather variable and, in addition to the typical ♀-form *beatrice*, Fruhstorfer recognised two further female forms in Malaya : ♀-form *ornamenta* Fruhstorfer, 1907, in which the hind-wing has a series of 3 to 5 white submarginal spots, and ♀-form *agina* Fruhstorfer, 1902, in which the fore-wing submarginal band is whitish and not blue as in typical *beatrice*. This last-named form is the usual type in Singapore and Johore and *agina* should be regarded as the subspecific name for *E. hypermnestra* from this area. In Tioman Island, off the east coast of the Malay Peninsula, the subspecies *nimota* Corbet, 1937, is larger and the female has the fore-wing submarginal fascia whitish as in *agina*.

There is a paucity of reliable data regarding the position when two well-defined geographical races of a Rhopalocerous species meet. From the available evidence, however, it appears that such races differ by a large number of genetical factors, so that any interbreeding results in the production of a large number of intermediate forms. In this connection, see Waterhouse, 1922, *Proc. linn. Soc. N.S.W.* **47 :** ix–xvii and 1923, *Proc. linn. Soc. N.S.W.* **48 :** xiii–xvi, where it is shown that the highly variable race *joanna* (Butler, 1866) is a

natural hybrid between the neighbouring races *abeona* (Donovan, 1805) and *morrisi* Waterhouse, 1914, of the Satyrid species *Tisiphone abeona*.

Elymnias hypermnestra is a fairly common species in secondary growth associations on the plains in Malaya proper, the larva feeding on *Cocos nucifera* among other plants. I have seen hundreds of this butterfly in Malaya proper and I am sure that it prefers the shade and is not often taken in flight in the open. In north Kedah and the Langkawi Islands, however, where the female is orange-red, the butterfly inclines to be more of an open country insect and is often taken in flight during the day-time, the orange-red female thus behaving in the same way as the *Danaus* species it resembles. In fact, as reported elsewhere (Corbet, 1937, *Proc. R. ent. Soc. Lond.* (B) **6** : 98), the first females of *E. hypermnestra tinctoria* Mre. taken by me in north Kedah were captured under the impression that they were a *Danaus* species.

The coconut palm is cultivated extensively in Penang, Province Wellesley and Kedah in north-west Malaya, so that it is probable that the distribution of *E. hypermnestra* is practically continuous between Johore in the south and Kedah and Perlis in the extreme north-west of British Malaya. It is of considerable interest, therefore, to find that, between the areas occupied by the races *tinctoria* Mre. and *beatrice* Fruh., is a region in which the females are extremely variable and grade from almost typical *tinctoria* to the usual *beatrice* form. The female of *discrepans* Distant, 1882, which was described from Penang and Province Wellesley, and is figured in Distant, *Rhop. Malay.*, pl. vi, fig. 3, is such an intermediate specimen, although nearer to the Kedawi form than to *beatrice* from Malaya proper.

In the British Museum is a series of 5 males and 9 females from Penang. The males, of course, are hardly distinguishable from the same sex from Kedawi or Malaya proper, but the females intergrade from typical *beatrice* to a form approaching *tinctoria*, although all these females have the upperside of the hind-wing brown as in *beatrice*. The females may be grouped as under :—

No. 1 resembles Distant's figure of *discrepans* female, but the pale orange area on the upperside of the fore-wing is more extensive and includes most of the cell, and the medial area on the hind-wing is noticeably suffused with orange-brown.

No. 2 has the orange area of the fore-wing deeper in colour and more reddish-brown, but more restricted, than in Distant's figure of *discrepans* : the medial area on the hind-wing is only slightly suffused with orange-brown.

In No. 3, the orange area on the fore-wing comprises a diffuse, circular spot in the medial area and it is deeper brown and smaller in size than in No. 2. On the hind-wing, the medial orange area is darker than in No. 2, but it is more clearly defined and there is a series of white submarginal spots.

No. 4 has the baso-dorsal half of the fore-wing deep reddish-brown. The hind-wing is without an orange area and has a series of rather faint, white, submarginal spots.

The remainder (Nos. 5–9) show gradations from those with a small but distinct reddish-brown area on the fore-wing to those without such colouring. Usually, the hind-wing has a distinct series of white submarginal spots, and in all but one example, the marginal third of the wing is paler and of an ochreous buff hue, although tinged with reddish-brown where it meets the rest of the wing.

Whether the intermediate forms occurring in Province Wellesley and Penang should be regarded as a subspecies distinct from the neighbouring races *tinctoria* Mre. and *beatrice* Fruh. may be an open question. Personally, I consider it

preferable to follow the procedure adopted by Waterhouse when dealing with *Tisiphone abeona* (Don.) and to regard these intermediates which occur in a clearly defined area as pertaining to the subspecies *discrepans* Dist.

The Malayan races of *E. hypermnestra* can now be listed as under :—

E. hypermnestra tinctoria Moore, 1879 : Langkawi Islands, Kedah and Perlis.

E. hypermnestra discrepans Distant, 1882 : Province Wellesley and Penang.

E. hypermnestra beatrice Fruhstorfer, 1902 : Malaya proper, south of Penang and north of Johore.

E. hypermnestra agina Fruhstorfer, 1901 : Johore and Singapore.

E. hypermnestra nimota Corbet, 1937 : Tioman Island.

A NEW SPECIES OF *DASYHELEA* (DIPTERA) FROM THE BAHAMA ISLANDS

By J. W. S. Macfie, M.A., D.Sc., M.B., Ch.B., F.R.E.S.

Dasyhelea maculata sp. n.

A dark brown species with the legs almost uniformly pale brown, and the scutellum yellowish-brown. Allied to the Chilean species *D. albopicta*, but differing as indicated below.

Male and female. Length of wing about 1·3–1·5 mm., greatest breadth about 0·4–0·5 mm.

Head very dark brown. Eyes apparently bare. Palpi pale brown, but last segment darker than others : segments sub-cylindrical, third not inflated, without pit, lengths of last four segments in one specimen 8, 14, 16, and 17 units respectively. Antennae brown, in female segments 3–7 paler than others; finely sculptured. In male plume not very dark : segments 4–11 successively narrower, measuring in one specimen from 12 by 13 to 13 by 10 units; 12–14 elongated, binodose, their lengths about 30, 28, and 24 units respectively; 15 rather longer, about 35 units, tapering at end, with stylet rather long, about 5 units, and not nipple-like. In female, segments 4–10 ranging in one specimen from about 9 by 9 to 10 by 7–8 units, bearing slender, curved, spines about as long as segments; 11–14 more elongate, sub-equal, about 14 by 7 units; 15 slightly longer, about 20 units, the last 3 units being the length of the straight stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 79, 68, and 78 units respectively.

Thorax rather dark brown, with traces of usual stripes on mesonotum, and with shoulder areas and sides paler, yellowish-brown, and some of the hairs in these areas infuscated at bases, thus producing a spotted appearance. Scutellum yellowish-brown, but darker in middle and at sides; bearing in both sexes 2 lateral, and 4–5 centro-marginal bristles, but no small hairs.

Wings unadorned, but in females with dark patch in middle of anterior border due to infuscation of veins which enclose second radial cell. Macrotrichia not very dense, but covering greater part of surface excepting radial areas; in anal cell numerous in female, almost wanting in male. Bare areas along veins distinct and rather wide. Costa extending slightly beyond middle of wing in both sexes. First radial cell obliterated, second longer

than broad. Fork of Cu well proximal to end of costa in both sexes. Halteres with whitish knobs which, however, bear an infuscated patch.

Legs almost uniformly pale brown, but femora with small darkish patch near middle, and all joints and 5th tarsal segments darkened. Form of segments and claws normal. T.R. about 1·6 in both sexes.

Abdomen with tergites dark brown, with small pale spots at points of insertion of hairs, narrowly paler posteriorly especially in males, and with paler median antero-posterior stripe. Sides pale brown, flecked with dark brown spots and streaks. Ventral surface mainly pale, but on segments 4–8 with dark brown area on each side of middle line. Spermathecae 2, moderately well chitinised, sparsely pitted, oval and rather variable in size, sub-equal, in one specimen measuring about 65 μ by 48 μ, tapering to duct, which otherwise is not chitinised at its commencement. Hypopygium (fig. 1) somewhat similar

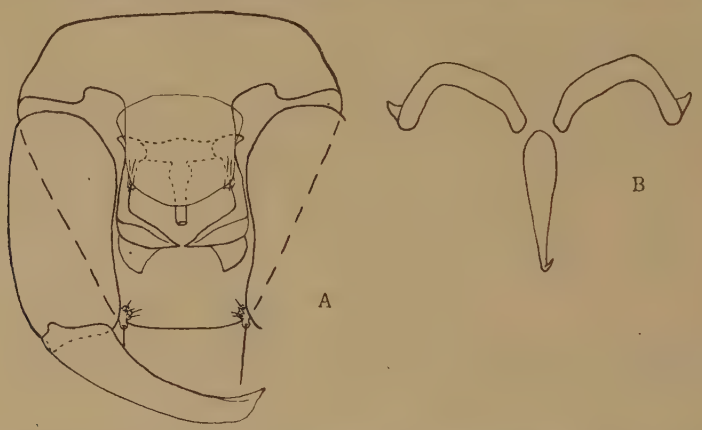

Fig. 1.—*Dasyhelea maculata* sp. n.: ventral views of hypopygium of male—(A) ninth segment and aedeagus; (B) harpes.

to that of *D. albopicta*. Ninth sternite without bristles, produced in middle line posteriorly as large oval plate. Ninth tergite pale posteriorly, with quite small processes at lateral angles. Side-pieces and claspers very dark brown. Harpes as in *D. albopicta*, two narrow, curved, transverse bands with a median process projecting posteriorly and ending in a sharp tip which is bent ventrally. Chitinised portions of aedeagus complex, appearing in ventral view as shown in figure.

Bahama Islands: L. Cunningham, New Providence, May 1941, 4 ♂, 11 ♀ (*Mr. A. Dean Peggs*). The specimens had been preserved in spirit and so may have appeared a paler colour than they were during life.

This is a smaller insect than *D. albopicta*, length of wing 1·3–1·5 mm. instead of 2·0–2·1 mm., and the femora and tibiae are pale brown, not dark brown. The hypopygium, too, shows several points of distinction, notably in the form of the aedeagus.

The types of this new species are in the collection of the British Museum (Natural History).

A NEW SPECIES OF *MICROVELIA* (HEMIPTERA, VELIIDAE) FROM TRINIDAD

By W. E. China, M.A., F.R.E.S.

The Veliidae collected by Dr. Noel Hynes in Trinidad in 1941–1942 and submitted to me for identification are represented by *Rhagovelia elegans* Uhler, *Rhagovelia tenuipes* Champion, *Rhagovelia* sp. near *femoralis* Champion (not *R. abrupta* Gould nor *R. panda* Drake and Harris which are closely allied), *Rhagovelia calopa* Drake and Harris, *Microvelia robusta* Uhler, *Microvelia mimula* B. White, *Microvelia longipes* Uhler, *Microvelia distanti* Lundblad (= *insignis* Distant 1912 *nec* 1903), *Microvelia stellata* Kirkaldy and a new species of *Microvelia* which I herewith propose to describe. In addition Dr. Hynes collected *Rhagovelia plumbea* Uhler and *Velia brachialis* Stål on the neighbouring island of Tobago.

Microvelia trinitatis sp. n. (figs. 1 and 2).

Colour, winged ♂ and ♀. Head dull black with a short grey pubescence, longer and more visible at sides along inner margins of eyes, a narrow median percurrent longitudinal furrow and the clypeus shining black: a small jet-black spot in each posterior lateral angle of vertex; bucculae sordid yellowish-grey; eyes dark brown; rostrum sordid yellowish-brown, the apical segment shining black; antenna dark brown, the base of first segment sordid yellowish-grey. Pronotum dull fuscous brown, the anterior region in front of humeral angles and including collar uniformly fulvous, the fulvous area extending posteriorly on each side of the median ridge, which remains fuscous, nearly to the anterior margin of the pronotum; pronotal punctures dark brown. Pro-, meso- and metapleura and acetabula dull fulvous yellow, the sterna dull brownish-black, the dark colour of the mesosternum extending a little on to the mesopleura between the middle and hind acetabula. Hemielytron dark fuscous brown, shading to dark grey along the inner (anal) margin, veins indistinct and unicolorous; a whitish stripe at base of corium, widening from base to its obliquely truncate apex and extending a little below the apex of the pronotum, cells with three large greyish spots arranged as in fig. 1, the anterior spot tending to be divided into two by a fuscous stripe. Coxae, trochanters and femora pale whitish-yellow, the apex of front femur, the apical third of middle femur and apical half of hind femur dark fuscous to black; all tibiae and tarsi dark fuscous shading to black at apices of tarsi. Dorsum of abdomen including connexivum yellowish-brown; venter dull black with the sides broadly fulvous, this fulvous band broadening on to the seventh sternite, a row of small jet-black spots down inner margin of each lateral fulvous band, approximately two to each segment; genital segment fulvous.

Brachypterous ♂. Similar in coloration to macropterous ♂ and ♀, but abbreviated wings uniformly fuscous without white or grey markings.

Structure, winged ♂. Head triangular, strongly convex, slightly longer in middle than wide at base between the eyes (20 : 18), width including eyes one and a half times length (30 : 20), distinctly wider than anterior margin of pronotum; each eye about one-third as wide as head at base between the eyes (6 : 18); a narrow glabrous percurrent furrow down middle of head, three small setigerous sensory pustules on each side of head, one in basal lateral angle jet black, the other pair reddish-brown, placed relatively close

together along upper half of inner margin of eye; sides of head inside eyes with a short silvery pubescence; clypeus with several longer dark hairs; rostrum extending to apices of front coxae, relative lengths of segments 4 : 9 : 16 : 7; antennae as long as head and pronotum together, relative lengths of segments 12 : 11 : 15 : 19, the first segment distinctly thickened, the second slightly thickened, the third slender and linear, the fourth fusiform, about as thick in middle as second; covered with short pubescence longer on fourth segment, especially at apex.

Fig. 1.—*Microvelia trinitatis* sp. n. macropterous male.

Pronotum with narrow annular collar, humeral angles prominent, apex broadly rounded, the posterior lateral margins forming rather less than a right angle; distinctly wider across humeral angles than long in the middle (52 : 40) and slightly wider anteriorly than half width across humeral angles (27 : 52); a rather flat broad ridge down the middle and some obscure punctures on anterior half of disc and a number of larger and deeper ones regularly spaced on posterior half (difficult to see with low magnification); covered with a very short bristly golden pubescence rather longer on apical half; mesosternum broadly furrowed in middle, the furrow occupying whole width at posterior margin and narrowing strongly anteriorly, a distinct concave impression below each of anterior coxae, the ridges on each side of median furrow and the posterior margin covered with short depressed golden pubescence; metasternum also with similar but rather longer pubescence on posterior half. Hemielytra extending to apex of abdomen, but exposing edges of vertical connexivum on each side; corium with moderately long semi-erect golden pubescence especially along veins which are moderately distinct and longer along base of costal margin; membrane glabrous with the veins indistinct. Intermediate and hind femora with a row of well-

spaced very fine bristles along posterior margin, about half as long as width of femora; tibiae, especially anterior and posterior pairs, with a few bristles along anterior margin,

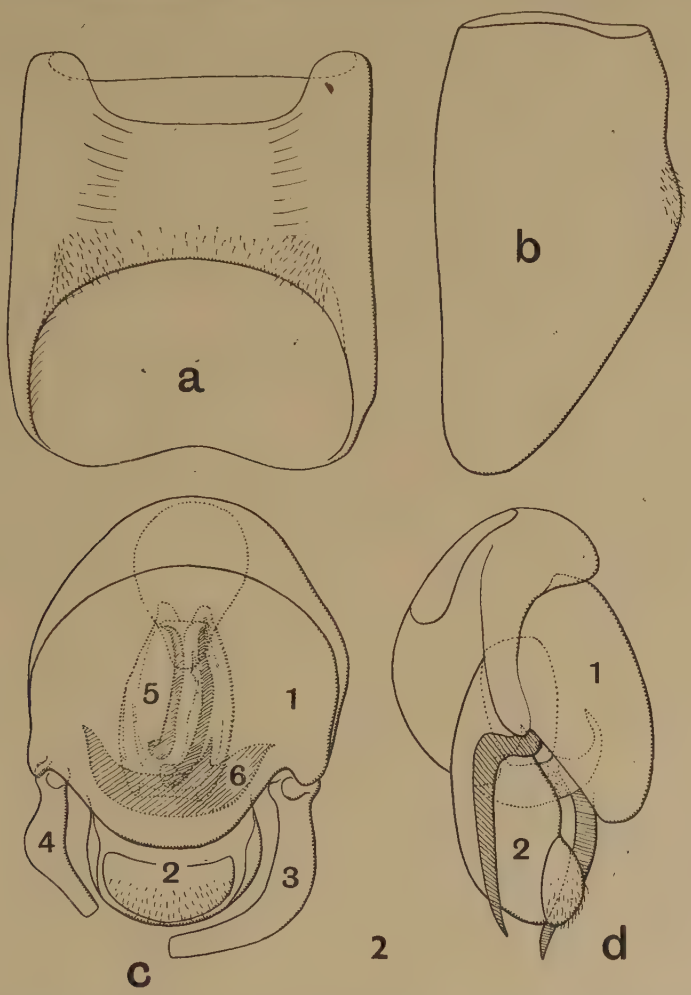

FIG. 2.—*Microvelia trinitatis* sp. n. male genitalia. a. ventral view of eighth segment. b. right-hand lateral view of same. c. ventral view of ninth and tenth segments with aedeagus *in situ* shown by dotted line. d. right-hand lateral view of same. 1. ninth sternite; 2. tenth segment with anal lid; 3. left-hand paramere; 4. right-hand paramere; 5. penis (phallosoma) containing swell-body (endosoma) with its two chitinous rods; 6. penis lever (theca) on which penis hinges.

the intermediate tibiae with a few long bristles along apical half of posterior margin; anterior tibiae ending in a short spur on ventral side. Relative lengths of legs:—

	Coxa	Trochanter	Femur	Tibia	Tarsus 1	Tarsus 2
Front leg . .	6	9	28	23	—	13
Middle leg . .	8	12	34	30	6	11
Hind leg . .	10	11	35	40	8	12

Venter distinctly and broadly concave along median line, the eighth ventrite distinctly longer than the seventh (10 : 8) and strongly concave in middle, sides of venter covered with sub-erect moderately long pale pubescence, longer towards apex of venter; no tubercles or tufts of hair on venter.

Male genitalia (fig. 2):—The two parameres (copulation hooks) without hairs, similar in shape, laminate, curved, broadest in middle, narrowing to truncate apex, the left-hand paramere nearly twice as large as right-hand paramere and more strongly curved; pygophor (ninth segment produced posteriorly between parameres in a broad rounded lobe), at the base with a deep constriction parallel (ventral view) with the basal margin of ventral side; anal segment large, lobate; aedeagus short, tubular, narrowest at apex and widest just above base containing the swell body (Ekblom [1]) with two chitinous sinuous rods within; lever of penis (theca of Peytoureau) at posterior end of penis strongly chitinised, broadly arched and broadly curved, much wider than the penis. Basal plates obsolete or not readily visible.[2]

Total length:—1·79 mm.; width across humeral angles 0·75 mm.

Macropterous ♀. Similar to male but middle tibiae without the long bristles along apical half of posterior margin. Seventh ventrite much longer than sixth (18 : 10), not strongly concave in middle.

Total length:—1·87 mm.; width across humeral angles 0·79 mm.

Brachypterous ♂. Distinctly smaller and much narrower than macropterous male, with the pronotum less convex, the humeral angles less prominent. Hemielytra extending only slightly beyond apical margin of fifth tergite. Pronotum about four-fifths as long in middle as wide across humeral angles (38 : 50) and distinctly more than half as wide anteriorly as long in middle (27 : 38).

Total length:—1·77 mm.; width across humeral angles, 0·71 mm.

Habitat:—British West Indies, Trinidad, El Tucuche. On upland forest rock pools; 11 ♂♂ (including type) and 9 ♀♀, seepage pool, 2400 ft., 10.i.1942 (*N. Hynes*); collection no. 146 (2); 3 ♂♂ (including brachypterous form), 3 ♀♀ and 4 nymphs, seepage pool, 2700 ft., 10.i.1942 (*N. Hynes*), collection no. 143 (3). *Microvelia* sp. "D" in Hynes List.

This seems to be a very distinct species, judging by the rather inadequate descriptions of the numerous other American species of *Microvelia*. The striking coloration of the pronotum and the relative lengths of antennal segments are characteristic. The apterous form is unknown.

[1] See Ekblom's description of the male genitalia of *Velia currens*. *Zool. Bidrag Uppsala* **10** : 139–143, figs. 207–216, 1926.

[2] It is not clear whether the penis lever represents the fused basal plates or not. In the primitive *Idiocoris* (Esaki and China, 1927, *Trans. ent. Soc. Lond.* **75**, part 2 : 289, fig. 8) both basal plates and penis lever (AP.AE) are present.

Book Notice.

Biological control of insects. By Hugh Nicol. 8vo. Harmondsworth, Mdx. (Penguin Books Ltd.), 1943. pp. 1–174, 8 pls., 10 figs. Price 9*d*.

This book contains a popular discussion of biological control of insects, and is published at a price which makes it available to any reader interested in the subject. The author uses a style which can be understood by anyone. A short list of books suitable for further reading is given, and there is a "quiz" of 16 questions, with the answers on a later page.

John Ray Naturalist. His life and works. By Charles E. Raven. 8vo. Cambridge, 1942 (Cambridge University Press). pp. xix + 502, frontisp. Price £1 10*s*.

In the preface the author says that his concern in this book " is not with the general record of man's discovery of the scientific method or of his application of it to the service of his needs and ambitions, so much as with one consequence of those events." As a theologian, his task long ago convinced him of " the importance of the change in man's aesthetic, moral and religious outlook which had accompanied and in large measure inspired the scientific movement." As a result of his investigations he formed the opinion that to John Ray was due, more than to any other biologist, that change which arose from the old world of superstition based on deduction from the Bible and the works of Aristotle, to a basis of knowledge founded on true observation of nature.

The book is arranged in seventeen chapters with the following titles :—

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II. At Cambridge University.
III. First studies in science.
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IX. The *History of Plants.*
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XIV. Of mammals and reptiles.
XV. The *History of Insects.*
XVI. Of fossils and geology.
XVII. The *Wisdom of God.*

A portrait of Ray forms a frontispiece to the work, and a *General Index*, *Index of Flora*, and *Index of Fauna* complete the volume. The book is very attractively printed on good paper. The appearance of such a work at the present time must be welcome to all lovers of a good book.

Studies of North American Plecoptera, with special reference to the fauna of Illinois. By T. H. Frison. *Bull. Ill. nat. Hist. Surv.* **22** : 231+355, 126 figs. Urbana, Illinois, 1942.

This paper is the result of a continuation of studies on the stonefly fauna of Illinois started in 1926, which have recently been extended to include the whole North American fauna. A revised list of the Plecoptera of the State of Illinois is given, and the majority of the species are illustrated in some detail, particular attention being paid to male and female genitalia.

A number of new species discovered during the study are described, and a revised classification is proposed on the basis of the results obtained.

Studies in the genetics of Drosophila. II. Gene variation and evolution. Directed by J. T. Patterson. 8vo. Austin, Texas, U.S.A. (University of Texas Publication No. 4228). 1942. pp. 1+200. Price $1.00.

This part of the University of Texas Publications comprises ten papers dealing with variation in *Drosophila* of various groups. The papers included are entitled :

I. Interspecific hybridization in the Genus *Drosophila*. By J. T. Patterson.
II. Heterosis in *Drosophila Hydei*. By Wilson S. Stone.
III. Analysis of the repleta group of *Drosophila*. By Linda T. Wharton.
IV. Cross fertility and isolating mechanisms in the *Drosophila mulleri* group. By J. F. Crow.
V. Relationships in the *Melanica* species group. By A. B. Griffen.
VI. Genetic relationships in the *Drosophila funebris* Group. By G. B. Mainland.
VII. A study of intersexes produced by a dominant mutation in *Drosophila virilis*, Blanco Stock. By W. W. Newby.
VIII. The Ix^b factor and sex determination. By Wilson S. Stone.
IX. Distribution of the *virilis* group in the United States. By J. T. Patterson.
X. Genetic and cytological analysis of the *virilis* species group. By J. T. Patterson, Wilson S. Stone, and A. B. Griffen.

Atlas of the Scale Insects of North America. By G. F. Ferris. Fourth Series. Nos. 385–444 (60 pls.). 1942. 4to. Stanford, Calif. (Stanford University Press, Stanford University), and Oxford University Press. Price, bound £2 2*s.*; unbound £1 15*s.*

This fourth volume follows exactly the pattern of Volumes 1–3, already noticed in the *Proceedings*, but an innovation has been made in issuing the work in two forms. It may be purchased unbound for £1 15*s.* per volume, or £1 10*s.* if all four volumes are taken, and the bound edition of the volume costs £2 2*s.*

One new genus, twenty-one new species, and two new generic names are proposed in the volume, and a general index to the four series is provided. In the epilogue to the work the author states that it is probable the *Atlas* will be discontinued with the publication of this fourth volume. Whereas in happier times it was found possible to continue it with little financial loss, the present condition of the world has removed that possibility, and the loss now experienced has become excessive. Should the publication of the work be resumed after the war, the author has decided that he will not continue with the loose-leaf form.

The material available in the family Diaspididae has now all been studied, and the 345 species which the author considers should be assigned to the family have all been dealt with. Five known species are not available, and have not been dealt with in the work. In the author's opinion the 345 species so far described probably represent not more than one-third of the species of the family which exist in North America.

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A uniform method is adopted for the citation of bibliographical references in the Society's publications as follows:

Smith, A., 1936, New species of Coccidae. *Proc. R. ent. Soc. Lond.* (B) **6** : 301–306, pl. 1.

——. 1936, New species of Coccidae. *Trans. R. ent. Soc. Lond.* **84** : 901–936.

Titles of periodicals cited are to be abbreviated in the manner indicated in the *World List of Scientific Periodicals, 2nd edition*, 1934.

Authors are entitled to receive 25 copies of their papers free of charge and may purchase additional copies provided that request be made before publication.

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TO BE HELD IN THE SOCIETY'S ROOMS

41, Queen's Gate, S.W.7

1943.

WEDNESDAY, October 6
„ November 3
„ December 1

1944.

„ January 19 (ANNUAL MEETING)
„ February 2

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